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The Indo-Australian species of the Zuphiine genus Agastus Schmidt-Göbel

(Insecta, Coleoptera, Carabidae)

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Abstract

The Indo-Australian species of the Zuphiine genus *Agastus* Schm.-G. are revised and compared in a key. *Agastus biseriatus* spec. nov. from Borneo is newly described. The supposed relations of the four known species are described in a cladogram. Phylogenetic status and distribution of species point to a relatively recent eastward migration within the eastern section of the genus range, with subsequent evolution of new species in Indonesia and in New Guinea. As a consequence, the most derived species occurs today at the southeastern border of the range. The eastwards migration within the eastern areal of the genus and the occurrence of the most generalized species as far west as India leads to the assumption, that the genus originated presumably in tropical Africa and immigrated into South Asia.

Introduction

The Zuphiine genus *Agastus* Schm.-G. has a curious history. Schmidt-Göbel erected the genus 1846 for his species *A. lineatus* Schm.-G. from southern Asia. 1875 a second species, *A. ustulatus* Gestro, from Malaysia and Indonesia was added. Both species are so far known from very few specimens. As late as 1931 described Alluaud his *Patrizia zuphioides* from tropical Africa, on which species Basilewsky (1953) erected a new tribe Patriziini within Zuphiinae. Since that time several species have been described from Africa, all under the generic name *Patrizia*. Only 1972 Mateu observed, that *Agastus* and *Patrizia* are congeneric, thus, *Patrizia* is a younger synonym of *Agastus*. This opinion was confirmed by comparison of the material before me. Strange enough, *Agastus* was classed by Jedlicka (1963) within subfamily Lebiinae and placed to Cymindina.

Meanwhile the tribe Patriziini was extended (Basilewsky 1962) to include a large part of Zuphiinae (Reichardt 1971, 1972, 1977; Mateu 1982). Baehr (1985a), however, suggested, that the character used for distinguishing by Basilewsky (1962) is not so distinct, that it can be used for definition of a tribe. Baehr (1985b) described also an additional species from New Guinea, thus, the genus ranges now over the whole Old World tropics with exception of north Australia.

The very recent discovery of most species is evidence of the rarity of *Agastus* species in their environment or of their occurrence in very specialized habitats. Actually, nothing is known on their habits. Baehr (1985b) draw attention to the huge, glandular apical segments of their maxillary palpi and thought it possible, that these beetles live in ants or termites nests, with the consequence, that they are collected only sporadic when flying to light. The increasing use of light traps in last years could also account for the increasing number of species discovered. However, at present species of *Agastus* are rarities in the collections throughout the world.

Since an additional new species has been discovered in the material received for comparison from British Museum (Nat. Hist.), the Indo-Australian species of genus *Agastus* are here treated comprehensively.

Acknowledgements

For kind loan of types and of specimens for comparison I sincerely thank following persons: Dr. F. Hieke (Berlin), Mr. G. Kibby (London), Dr. G. Scherer (München), Dr. N. E. Stork (London), Mr. T. A. Weir (Canberra).

Abbreviations of collections cited in text

ANIC – Australian National Insect Collection, Canberra
BM – British Museum (Natural History), London
MCSN – Museo Civico di Storia Naturale, Genova
MNB – Museum für Naturkunde, Berlin

Measurements

Some measurements are presented in Tab. 1. Body length has been measured from apex of labrum to tip of elytra at their longest part. Measurements were made with a stereomicroscope using an ocular micrometer with up to 160× magnification.

Characters

Since ♂♂ of most Indo-Australian species are so far unknown, structure of aedeagus can be not used at present as diagnostic character. Most useful characters include: Body shape, relative size of eyes, shape and length of antennae, shape of pronotum, length and density of pilosity, and to some extent also pattern and colour.

Classification

Tribe Patriziini of subfamily Zuphiinae

Patriziini Basilewsky, 1953, p. 266
Basilewsky 1962, p. 107
Reichardt 1971, p. 86; 1972, p. 266; 1977, p. 448
Mateu 1972, p. 50; 1982, p. 45
Baehr 1984, p. 117; 1985b, p. 224

Type genus: *Agastus* Schmidt-Göbel

Genus Agastus Schmidt-Göbel

Agastus Schmidt-Göbel, 1846, p. 31
Lacordaire 1954, p. 87
Gestro 1875, p. 867
Bates 1889, p. 280; 1892, p. 388
Andrewes 1923, p. 10

Csiki 1932, p. 1567
Jedlicka 1963, p. 451
Mateu 1972, p. 49; 1982, p. 45
Reichardt 1972, p. 265
Baehr 1984, p. 117; 1985b, p. 224

Type species: *Agastus lineatus* Schmidt-Göbel

Diagnosis: Head large, square behind, "neck" distinct, narrow. Posterior supraorbital seta far removed from eye, near hind border of head. Mentum with unidentate tooth. Glossa elongate, apically square, bisetose. Paraglossae membraneous, short, tied to glossa. Lacinia bristled. Labial palpus small, acute, maxillary palpus very large, terminal segment huge, apex square. Antennae moniliform. 1st segment densely pilose, with a long tactile seta. Pronotum cordate, base laterally excised. Anterior lateral seta situated directly behind anterior angles, posterior seta at posterior angles. Elytra elongate, parallel. Shoulders produced. Apex rounded, drawn in to suture. 1st to 7th intervals ridge-shaped, much narrower than striae. Whole body yellowish pilose. Colour yellowish to brown. All species winged.

Tab. 1. Some measurements and indices of Indo-Australian species of genus *Agastus*. N: number of specimens measured, 1: length; 2: ratio length/width of elytra; 3: ratio length/width of pronotum; 4: ratio width of pronotum at widest part/width of pronotum at posterior angles; 5: ratio width of head/width of pronotum; 6: ratio width of elytra/width of pronotum; 7: ratio length of temples/length of eye; 8: ratio length/width of 6th antennal segment; 9: ratio length of antenna/length of body.

	N	1	2	3	4	5
A. lineatus	10	4.48–4.85	1.62–1.7	1.04–1.08	1.24–1.32	0.95–1.01
A. lineatus (Celebes)	1	4.24	1.48	1.06	1.21	0.99
A. ustulatus	3	4.12–4.28	1.78–1.86	1.09–1.16	1.3–1.32	0.99–1.03
A. hirsutus	1	4.84	1.6	1.06	1.29	0.94
A. biseriatus	1	4.4	1.67	1.06	1.37	0.97

	N	6	7	8	9
A. lineatus	10	1.64–1.7	0.9–1.1	1.1–1.15	0.45–0.5
A. lineatus (Celebes)	1	1.79	1.14	1.05	0.46
A. ustulatus	3	1.48–1.54	1.22–1.27	0.93–0.95	0.43–0.45
A. hirsutus	1	1.59	1.29	0.91	0.43
A. biseriatus	1	1.73	1.04	1	0.46

Key to Indo-Australian species of genus Agastus

1. Smaller, less than 4.4 mm long. Body narrow, elongate, ratio length/width of elytra 1.8 or more. Pronotum considerably longer than wide, ratio length/width over 1.1. Dark pattern conspicuous, especially at apex of elytra. Pilosity very dense and short, regular, depressed. Hairs on elytra shorter than width of a stria. Puncture very fine. ..... *ustulatus* Gestro

– Generally larger, mostly over 4.5 mm long. Wider, ratio length/width of elytra less than 1.7. Pronotum just slightly longer than wide. Pattern indistinct, each elytron with an elongate, vague, light spot. Pilosity longer, less dense and regular, on elytra partly erected. Hairs on elytra generally longer than width of a stria. Puncture moderate to coarse. ..... 2.

2. Eyes considerably smaller than temples, ratio length of temples/length of eyes about 1.3. Lateral border of pronotum in front of posterior angles not regularly sinuate, strongly serrate. Posterior angles hook-shaped, projecting anteriorly. Terminal antennal segments considerably wider than long, ratio length/width about 0.8. Pilosity of surface long, hirsute, hairs on elytra considerably longer than width of a stria. ..... *hirsutus* Baehr

– Eyes about as long as temples or still longer, ratio length of temples/length of eyes 0.88–1.15. Lateral border of pronotum regularly rounded, posterior angles not hook-shaped, nor projecting anteriorly. Border less serrate. Terminal antennal segments as long as wide, or longer. Pilosity shorter, hairs not much longer than width of a stria. ..... 3.

3. Hind border of head square, temples straight. Pronotum not strongly convex in middle, less strongly cordate, at posterior angles far narrower than at widest part. Pilosity on elytra irregular, rather elongate. Striae pilose at bottom. ..... *lineatus* Schmidt-Göbel

– Hind border of head rather convex, temples narrowed and slightly rounded. Pronotum strongly convex in middle, strongly cordate, at posterior angles nearly as wide as at widest part. Pilosity of elytra regular, biseriate, a row of hairs each laterally of each interval. Striae without additional hairs at bottom. . . *biseriatus* spec. nov.

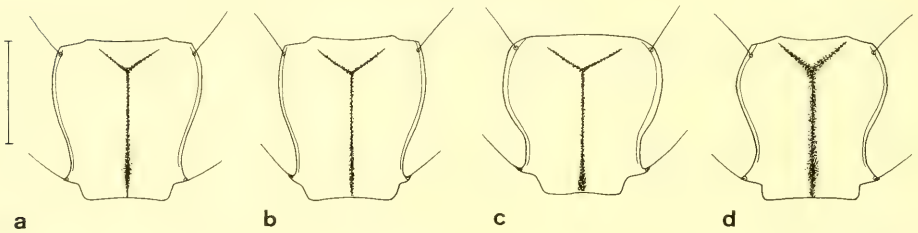

Fig. 1. Pronotum. a. *Agastus lineatus* Schmidt-Göbel; b. *A. ustulatus* Gestro; c. *A. hirsutus* Baehr; d. *A. biseriatus* spec. nov. Scale: 0.5 mm.

Agastus lineatus Schmidt-Göbel, 1846
(Fig. 1a)

Schmidt-Göbel, 1846, p. 31
Lacordaire 1854, p. 87
Gestro 1875, p. 867
Bates 1889, p. 280; 1892, p. 388
Andrewes 1923, p. 10
Csiki 1932, p. 1567
Jedlicka 1963, p. 452
Mateu 1972, p. 49
Baehr 1985b, p. 226

Types: The holotype is located in the Museum Prague. According to Andrewes (1923) and Jedlicka (1963) it is badly damaged. Both authors, however, examined the type. There was a specimen before me labelled "Compared with type, H. E. Andrewes" (BM).

Type locality: "Birma".

Diagnosis: A rather large, wide species with large eyes, long antennae, moderately long, irregular pilosity, and rather wide, regularly sinuate pronotum.

Description

Length: 4.3–4.85 mm, width: 1.3–1.4 mm. Colour light brown, some individuals with a very vague, elongate, light spot on each elytron. Legs, mouthparts, and antennae slightly lighter.

Head wide, square, temples straight, only the very posterior angle rounded off. Eyes large, somewhat smaller to slightly larger than temples. Antennae nearly half as long as body, median and terminal segments clearly longer than wide. Pilosity rather long.

Korrigierte Tabelle – Bitte in Spixiana 9 (3), Pagina 320, einfügen!

Tabelle 2. – Merkmalsvergleich der erarbeiteten taxonomischen Gliederung des *L. danfordi*-Komplexes.

Tabelle 2 a

	Anzahl der untersuchten Tiere	Pileus $\frac{B}{L} \times 100$ bei	$\frac{\text{1. Supratemporale}}{\text{Parietale}} \times 100$		Temporalia	$\frac{\text{Massetericum Ø}}{\text{Parietale}} \times 100$		Dorsalia-Index	Gularia
			♂♂	♀♀		♂♂	♀♀		
	n	KRL ≧ 60 mm	x̄	x̄	x̄	x̄	x̄	x̄	x̄
Lacerta danfordi (Verband „C“)	151	43 – 46,7 – 50	24 – 40,7 – 57	24 – 39,9 – 51	7 – 9,7 – 12	10 – 18,3 – 31	11 – 18,4 – 30	100 – 126,1 – 159	22 – 25,7 – 32
L. d. danfordi	65	43 – 46,9 – 50	34 – 42,7 – 57	29 – 42,1 – 49	7 – 9,5 – 12	10 – 18,5 – 31	13 – 20,2 – 30	100 – 125,3 – 152	22 – 25,9 – 32
L. d. bileki	86	44 – 46,5 – 50	24 – 38,7 – 52	24 – 38,4 – 51	7 – 9,8 – 12	11 – 18,2 – 30	11 – 17,1 – 26	108 – 126,8 – 147	23 – 25,4 – 29
Lacerta oertzeni (Verband „B“)	318	43 – 46,6 – 50	21 – 43,4 – 64	21 – 42,6 – 43	8 – 11,8 – 15	7 – 15,1 – 29	6 – 14,8 – 26	105 – 132,4 – 159	21 – 26,9 – 31
L. o. oertzeni	36	45 – 47,4 – 50	37 – 45,1 – 52	40 – 45,6 – 54	10 – 12,3 – 15	5 – 14,2 – 25	9 – 13,2 – 18	114 – 128,8 – 151	26 – 29,2 – 31
L. o. pelasgiana	119	43 – 46,3 – 50	33 – 46,4 – 64	33 – 46,8 – 55	9 – 12,3 – 15	7 – 15,2 – 27	6 – 14,8 – 26	114 – 130,1 – 152	23 – 26,8 – 31
L. o. budaki	51	43 – 46,1 – 50	41 – 48,6 – 57	38 – 44,3 – 50	8 – 10,9 – 13	11 – 20,4 – 29	10 – 20,2 – 26	105 – 123,6 – 142	23 – 25,9 – 30
L. o. finikensis	16	44 – 45,6 – 47	32 – 36,8 – 39	27 – 38,5 – 49	9 – 11,4 – 14	11 – 18,8 – 28	11 – 13,2 – 15	120 – 133,4 – 146	24 – 27,3 – 29
L. o. ibrahimi	96	44 – 47,1 – 50	21 – 38,9 – 51	21 – 35,4 – 51	8 – 11,5 – 15	7 – 13,2 – 26	7 – 14,0 – 22	115 – 138,9 – 159	21 – 26,2 – 30
Lacerta anatolica (Verband „A“)	67	41 – 45,4 – 51	31 – 45,4 – 55	42 – 38,3 – 50	7 – 10,7 – 13	8 – 13,9 – 26	8 – 11,8 – 18	118 – 122,0 – 147	21 – 25,4 – 30
L. a. anatolica	62	41 – 45,4 – 48	31 – 41,0 – 49	25 – 38,1 – 45	7 – 10,7 – 13	8 – 14,0 – 26	8 – 11,6 – 14	105 – 121,7 – 147	23 – 25,5 – 30
L. anatolica aegaea	5	46 – 48,3 – 51	47 – 50,5 – 55	42 – 45,3 – 50	9 – 10,6 – 12	12 – 12,5 – 13	12 – 15,5 – 18	118 – 126,4 – 140	21 – 24,0 – 26

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Pronotum (Fig. 1a) nearly as wide as long, not very convex in middle, anteriorly slightly curved. Anterior angles obtuse, apex laterally oblique. Lateral border in front of posterior angles not strongly sinuate, posterior angles acute, but not projecting anteriorly. Sinuosity regular. Lateral border just slightly serrate. Pilosity irregular, rather erect.

Elytra rather wide, posteriorly slightly enlarged, about $1^2/_3\times$ as long as wide. Puncture moderate. Ridge-shaped intervals not grooved laterally by puncture. Pilosity rather long, irregular, partly erect, partly depressed. Hairs slightly longer than width of a stria. Striae pilose at bottom.

Aedeagus: Unknown, all specimens at hand are ♀♀.

Variation: Rather variable in size and proportions. There is a very small individual with wide elytra before me (MB) which bears a hand-written label "*Agastus celebensis* Chaud.", presumably written by Chaudoir himself, but no locality label. If this individual comes actually from Celebes, the known range of the species would be considerably extended. As can be seen from tab. 1, some proportions of this specimen do not fall within the variation range of the other specimens of *A. lineatus*. This may indicate, that a new taxon is evolving at southeastern border of the range of *A. lineatus*.

Distribution: According to literature (Gestro 1875, Andrewes 1923, Csiki 1932, Mateu 1972) and to the material at hand: India, Burma, Thailand, Cambodja, Vietnam, Philippines, Java, and perhaps Celebes.

Material examined (11):

India: 1♀, India, Nevieson Coll 1918–14, H. E. Andrewes det. (BM).

Thailand: 1♀, NO Thailand, Khon Koen, 23.i.1981, Lux, leg. Saowakoutha (MNB), 2♀♀, same locality, 25.II.1981 (MNB).

Cambodja: 1♀, Kompang Kedey, July 1914, R. V. de Salvaza (BM).

Philippines: 1♀, Philipp. Islands, Semper, *Agastus lineatus* Sch. Göb. compared with type H. E. A. (BM), 1♀, Puerto Princeso, Paragua 6/80 (Andr. Coll) (BM).

Java: 1♀, G. Kawi, Java, Drescher 8.1919 (BM).

Without locality: 1♀, (MNB), 1♀, "*costatulus* CHD." (MNB), 1♀, "bought from Janson 1918, "*Agastus celebensis* Chaud.", H. E. Andrewes Coll. (BM).

Agastus ustulatus Gestro, 1875
(Fig. 1b)

Gestro, 1875, p. 867
Mateu 1972, p. 49
Baehr 1985b, p. 226

Types: The holotype is located in the MCSN. It was not compared, but a specimen was before me labelled "compared with type, H. E. Andrewes" (BM). Because the species is well recognizable from description, comparing of holotype was not needed.

Type locality: Singapore.

Diagnosis: A small, elongate, slender species with small eyes, characterized by its distinctive dark apex of elytra and its regular, short pilosity.

Description

Length: 4.1–4.3 mm, width: 1.28–1.32 mm. Colour reddish-brown, apex of elytra darkened. Antennae, mouthparts, and legs yellowish.

Head wide, square, temples straigth, only the extreme tip of posterior angles rounded off. Eyes considerably shorter than temples. Antennae less than half of length of body. Median and terminal segments clearly wider than long. Pilosity of surface rather short and dense.

Pronotum (Fig. 1b) rather narrow, distinctly longer than wide, moderately convex. Anteriorly just slightly curved. Anterior angles obtuse, about 95°, apex laterally oblique. Sinuosity in front of poste-